

The University of Chicago

AN EVALUATION OF OPPOSED
THEORIES CONCERNING THE ETIOLO-
GY OF SO-CALLED DEMENTIA
IN DEMENTIA PRAECOX

A DISSERTATION SUBMITTED TO THE FACULTY
OF THE DIVISION OF THE BIOLOGICAL SCIENCES
IN CANDIDACY FOR THE DEGREE OF DOCTOR
OF PHILOSOPHY

DEPARTMENT OF PSYCHOLOGY
1936

By
MARY PHYLLIS WITTMAN

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THE ETIOLOGY OF SO-CALLED DEMENTIA IN
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I. Statement of the Problem

This paper presents a study of the validity of opposed theories concerning the etiology of so-called dementia in dementia praecox (schizophrenia)--theories stressing organic brain pathology as opposed to those stressing psychogenesis.

II. Orientation

The mental disorders coming under the term dementia praecox constitute a challenge to investigators in the field of psychological and psycho-analytic as well as of medical research.

In view of the fact that more than 50 per cent of all the more than 400,000 patients housed in mental institutions in the United States are suffering from dementia praecox, the importance of this psychosis can hardly be over-estimated. The financial burden of caring for this large population is placed at over \$40,000,000 annually. Judging, then, from the incidence and the cost of the psychosis as stated above, the necessity of accurate information regarding the various phases of this problem is apparent; but despite its importance there are very few experimentally proven facts known about it.

Stecker and Ebaugh (16) in speaking of dementia praecox write: "Its etiology is unsettled, its pathology unknown and its clinical limits in dispute, and yet it is a more serious problem than either tuberculosis or carcinoma."

The original concept of dementia praecox, formulated by Kraepelin (11), is probably the best known and possibly the most widely held. He included under this term various clinical entities which had been previously described but which he considered had at least two things in common--"that they are not, as far as can be seen, occasioned from without but arise from internal causes and that, at least in the great majority of cases, they lead to a more or less well marked mental enfeeblement." He states further that "this form of mental weakness, in spite of differences in detail, exhibits many features in common with

other forms of dementia, such as are known to us as the result of paralysis (paresis), senility or epilepsy." Kraepelin included therefore several clinical pictures under the one name "dementia praecox," which means literally, a dementing psychosis occurring at an early age.

In 1911 Bleuler (3) published different views concerning this psychotic group and renamed it "schizophrenia." He used this term because it implies the fundamental splitting he found between the emotional, intellectual, and motor processes. He did not stress "mental deterioration" as an important symptom of schizophrenia and considered it, when present, as due primarily to toxic factors (which produced the disinterest and inattention characteristic of the schizophrenic patient) rather than due to a permanent and specific inability.

Following the adoption of Bleuler's concept by some authorities, interest was turned to include the psychological analysis of dementia praecox and specific schizophrenic symptoms were sought. The works of Meyer (13) and of Hoch (8), for example, express a functional conception of dementia praecox which stresses the importance of psychogenic factors. Meyer emphasizes "faulty mental habits" and Hoch suggests that dementia praecox is most apt to arise in a "shut-in" personality.

At the present time the two terms, dementia praecox and schizophrenia, are often used as synonyms for the same psychotic states, but the etiological theories and the characteristics stressed by the two schools of thought are widely varied rather than in agreement. J. V. May (12) in an article on "The Dementia Praecox Schizophrenia Problem" considers "Kraepelin's original description of dementia praecox (as essentially a deteriorating process) is diametrically opposed to the theories later advanced by Bleuler." A study by May of the incidence of dementia praecox as reported by authorities in various parts of the country showed a wide divergence of opinion as to the nature of the disease.

One of the most obvious differences between the various theories concerning this psychosis is the disagreement as to the presence of a true "dementia" and the cause of it, if it is present. Up to this time, however, the conflicting conclusions reached have been based (with one outstanding exception) upon observation and study of the patient's reactions rather than on any direct experimental attack upon the problem (9). F. L. Wells (17), F. D. Barnes (2), E. G. Boring (5), S. L. Pressey (14), and other psychologists stressed the indifference and inattention typical of the schizophrenic patient's performance on psychometric tests but they did not try to evaluate experimentally the importance of this lack of co-operation in the test results.

Dr. Harriet Babcock's study (1) of intellectual deterioration in the dementia praecox patient is, however, an experimental attack upon this problem. This research purports to show:

"A. That experimental technique (a test of mental deterioration) gives evidence that the phenomena of dementia praecox are similar to those observed in other diseases where organic deterioration rather than mental habituation is the accepted basis of abnormality. Since deterioration will explain all the phenomena of dementia praecox, it is valid *prima facie* to accept the general explanation which accords with other types of abnormality, and it becomes unwarranted to hypothesize other causes based on observations of normal persons.

"B. That certain aspects of dementia praecox can only be explained with reference to a theory of mental impairment due to organic or physiological causes."

The technique of this study was to measure the mental efficiency¹ of dementia praecox patients and compare it with that of normal subjects to "learn whether their apparently weak attention and lack of interest and will correlate with mental inefficiency which is not within their control, or whether it exists with normal ability to perceive and fixate new data" (1).

Dr. Babcock based her conclusions on the comparison of results of "deterioration tests" given to 206 praecox subjects and 216 non-psychotic individuals. The psychotic group was divided into three sub-groups: (a) 124 subjects whose scores were compared directly with those of the normal subjects; (b) 42 "not unco-operative" subjects who could not give reliable vocabularies but who made some sort of response to all tests"; (c) 40 subjects "in such a low stage of mental inefficiency that they could neither give reliable vocabularies nor respond to test conditions in such a way as to make the results regularly capable of evaluation."

The median efficiency index she obtained for the normal subjects was +.05, and for the 124 praecox subjects whose co-operation was such that she compared their scores directly with the control group, -3.5.

¹The term "mental efficiency" is used to indicate a subject's mental ability at a given time without the assumption of stability and permanence that is often connoted by the term "mental ability."

²The term "co-operation" as used throughout this study means the motivation to react to the best of one's ability in a given situation.

From the data gathered Dr. Babcock concludes that "co-operative praecox patients are as a group inferior to normal persons in ability to understand and execute simple tests. The results also show that the intellectual defect which Kraepelin considered to exist in the very earliest stages, though the fact was was not then clearly demonstrable, not only exists but can also be measured."

The difficulty in accepting these conclusions lies in the fact that no attempt was made really to evaluate the "co-operativeness" of these "124 praecox patients." Their classification as co-operative is based simply on Dr. Babcock's subjective opinion of their reactions. Co-operation in a psychometric examination implies, however, more than just a fairly relevant response and a passive acquiescence to the requests of the examiner. A co-operative subject in a test situation is one who has the wish to do as well as possible because of the wants listed by Thorndike, such as want for success, want for personal regard, and want for esteem of the examiner.

In Dr. Babcock's study no evaluation was given to the factors of disinterest and inattention that conceivably might have influenced the degree of co-operativeness and interest her psychotic subjects took in the tests, and hence the effect these factors had on the test results was not determined. This is the problem which the present study seeks to investigate.

III. Rationale for the Technique Used in This Study

The majority of organically deteriorated patients (paretics, seniles, etc.) are as a general rule co-operative and interested enough in a test situation to do the best they can with their limited ability. In recognition of this, the clinical psychologist usually takes the co-operation of these patients on psychometric examinations more or less for granted (just as he does with the non-psychotic), unless their reactions indicate a definite lack of interest and attention. Consequently, if the patient's intellectual level is markedly lower than his former educational and professional achievements would lead one to expect, the possibility of an intellectual deterioration from a formerly higher mental level is assumed.¹ In other words, with

¹"The great majority of psychiatrists not only hold that dementia consists in the impairment of such extensive mental powers as memory, judgment, conception, etc., but also believe--in company with most psychologists--that an ordinary mental test measures one of these powers" (7).

organic cases, the indirect evidence of deterioration (i.e., poor performance on tests of present mental ability as compared with estimates of past ability) is regarded as a functional expression of the pathology present.

If, then, the poor showing made by a schizophrenic patient in tests of ability is due to an intellectual deterioration associated with organic pathology¹ (similar to that in the accepted organic psychoses), his co-operation, other things being equal, is not the primary factor in determining the results; his ability is the important factor.

However, when we attempt to test this premise, as we do in this study, we have to deal with three variables: (1) ability on the tests, (2) degree of co-operation, (3) actual degree of intellectual deterioration. Only the first two of these can be known experimentally. We study mental deterioration only as it is indirectly evidenced in the test results, so that if the co-operativeness of the patient must also be considered, it is difficult to determine the degree of intellectual deterioration, if any.

Since, then, there is no direct way of measuring this third variable, there is a possibility that in the dementia praecox cases degree of co-operation may be highly correlated with degree of deterioration and in turn with test scores. If such is the case, the unco-operative schizophrenic patient would also be the mentally deteriorated patient, and low test scores might be attributed to either one or both of these factors.

However, intellectual dementia on an organic basis is considered a more or less permanent thing, and although it is true that organically psychotic patients in a state of remission may show some improvement in mental efficiency, nevertheless this efficiency is seldom up to its previous maximum level. In addition, it is difficult to conceive of pathology severe enough to cause an intellectual deterioration changing with the ease and frequency of an "attitude" (i.e., one way of describing co-operativeness), which may change from one hour to the next.

Consequently, if we find patients who co-operated poorly and made low test scores on the initial examination, but who when

¹"The morbid anatomy of dementia praecox does not show macroscopically any striking changes of the cranial contents; only occasional thickening and oedema of the pia are reported, the latter evidently a result of agonal processes. On the other hand, it has been shown that in the cortex we have to do with severe and widespread disease of the nerve-tissue" (10).

retested two weeks or a month later (because they showed a marked improvement in attitude) make much higher scores on parallel forms of the tests, we can conclude that the initial low test scores were not due to an intellectual deterioration on an organic basis. An organic pathology, if directly comparable to that in paresis or senile dementia, would not only be profound enough to cause definite intellectual deterioration (dementia), but would result in the involvement and progressive destruction of cortical function. In such cases mental inefficiency would be causally related to this pathology rather than to the "attitude" of the patient and would not tend to lessen progressively as the patient's co-operativeness increased. Consequently, if change in mental efficiency for a given subject is directly proportional to the change he shows in degree of co-operativeness, we may assume that the "apparent" deterioration as measured by ability to perform given tests is not the same as the true deterioration of paresis and senile dementia.

Therefore, in this study, we shall

A. (1) Find the relationship between co-operation measures and ability scores for schizophrenic patients.

(2) Use the same estimates of co-operation and tests of ability on patients with a clinical diagnosis indicating a known organic pathology associated with progressive dementia (i.e., paresis) in order to note differences and similarities when compared with the schizophrenic group.

(3) Give the objective tests of co-operation and the tests of intellectual ability to a group of non-psychotics to check on the validity of the co-operation tests.

(The three groups will be roughly equated as to initial intellectual ability by making them directly comparable as far as educational achievement is concerned.)

B. Retest those schizophrenic subjects who show a definite change in co-operation, as determined by the examining psychiatrist, to find whether their ability scores are related directly to changes in degree of co-operation.

Then,

(a) If degrees of co-operation do not show a direct relationship with scores in tests of present mental ability on the retests, as well as on the initial tests, we may assume that the test scores give a fairly accurate measure of the true intellectual ability of the patient. In other words, such results would indicate that the patient has deteriorated intellectually, so that, although he may improve as far as "attitude" and the wish to co-operate are concerned, he is unable to do significantly better on the tests of ability because of this deterioration.

(b) If, however, we find a direct and significant relationship between changes in co-operativeness and changes in test scores, we have proved not only the rather obvious fact that the co-operativeness of the patient influences his test score, but that it is the lack of co-operation rather than a "progressive dementia" that is directly responsible for the low test scores made by the schizophrenic patients.

IV. Definition of Terms

The terms "dementia" and "deterioration" are used rather vaguely and indefinitely by many psychiatrists. The glossary of Stecker and Ebaugh's Clinical Psychiatry (16) gives the following: "Dementia-- a permanent loss of one or more of the mental faculties, as the deterioration of emotional life in unfavorable dementia praecox or the almost complete 'loss' of mind in the last stages of paresis, senile dementia, epileptic dementia, etc." Bleuler and Brill (4) give a different explanation: "Dementia (feeble-mindedness) is not a uniform condition. One deals here with a purely practical conception. Whoever fails in life because of intellectual inefficiency is demented. In a scientific sense, there is no uniform dementia, but only an oligophrenic, epileptic, organic dementia, i.e., forms which in their actual character are very different from one another. The diagnosis 'dementia' is scientifically never sufficient; one can diagnose only a particular kind of dementia."

The dictionary meaning for dementia is "An insanity characterized by loss or serious impairment of intellect, will and memory." Deterioration is defined as "an impairment or degeneration."

"Dementia" as it is used in this paper implies a permanent loss of mental ability, while "deterioration" implies an impairment of this ability (without bringing up the question of permanency), which may develop into a dementia. The two terms are further qualified by adjective modifiers--"intellectual" as differentiated from "emotional," and "organic" as distinguished from "functional."

V. Procedure

A. Subjects

The subjects used in this study included:

1. One hundred patients, inmates of the Elgin State Hospital, diagnosed as cases of dementia praecox at Cook County Psychopathic Hospital, and this diagnosis confirmed by the staff at

the Elgin Hospital.

2. Seventeen of these one hundred patients who had shown a decided change toward a more co-operative attitude in a relatively short time were retested with parallel forms of the initial ability tests.

3. Thirty patients, diagnosed syphilitic-meningo-encephalitis (paresis), at Cook County Psychopathic Hospital, and this diagnosis confirmed by the staff at the Elgin institution.

4. Thirty non-psychotic subjects consisting mainly of medical, clerical, and attendant personnel at the Elgin Hospital.

The patients were selected groups only to the extent of excluding: (1) patients of foreign birth and education, (2) patients under 16 or over 50 years of age, (3) patients with lower educational qualifications than graduation from grade school,¹ (4) mute, negativistic or actively resistive patients whose performance on any sort of test (because of their mute or negativistic attitude) could be safely predicted as zero.

In practice it was found advisable to administer the tests to all the patients in the psychologist's office, since the facilities for private testing on the wards, especially of bed patients, are limited (especially marked in the case of paretics), and hence a further selection was made of ambulatory cases that could come directly to the psychologist's office.

B. Test Material

1. Tests and Ratings of Co-operativeness

(a) A series of ten objective test measures of the attention, interest, and co-operativeness of the subject were used. These tests, the rationale used in selecting them, and the method of weighting and scoring them are given in Appendix A. of this paper.

(b) A check list² of levels of co-operation was filled out for each patient by his ward physician. A copy of this check list is given in Appendix B.

¹When all the parietic and over half of the schizophrenic group had been examined, a further selection of praecox patients was made in order to adjust the schizophrenic group in direct proportion to the parietic group as far as education was concerned. In addition, some of the non-psychotic subjects were dropped from that group and others added so that they were directly comparable in educational achievement with the other two groups.

²The check list and rating scale were not used with the non-psychotic group, since the co-operation of these volunteer

(c) A graphic rating scale of co-operativeness was used by the supervisor and by the charge attendant on the patient's ward in rating each patient. A copy of this scale and method of scoring is given in Appendix C.

2. Tests of Ability

(a) Tests of memory

- (1) Rote memory for words
- (2) Immediate reproduction of memory paragraph
- (3) Picture recognition
- (4) Paired associates
- (5) Retention of memory paragraph

(b) Tests of reasoning

- (1) Analogies
- (2) Number sequence
- (3) Similarities
- (4) Arithmetic problems
- (5) Essential differences

C. Method

1. Administration of Tests

Each Monday over a period of several months, the names of the patients admitted from Cook County Psychopathic Hospital the previous Friday¹ with a diagnosis of dementia praecox or paresis were listed. Those who could classify as appropriate subjects (that is, according to age, education, and other qualifications) were tested, usually after the examining staff physician had concurred in the diagnosis given at the Psychopathic Hospital. Of the praecox subjects tested, several had to be dropped because at staff conference the majority of the Elgin staff did not agree with the diagnosis of schizophrenia, and the classification was changed. This method of selecting patients required that the experimenter know the diagnosis of the patient previous to testing, but this knowledge did not influence the formal technique of giving and scoring the objective tests, and so did not influence the results.

The administration of the tests was the same for the schizophrenic, parietic, and non-psychotic subjects. In an attempt to gain the interest and hold the attention of the patients, all

subjects was more or less assumed, and their perfect scores on the objective tests of co-operation corroborated this assumption.

¹ Once a week patients are sent from the Cook County Psychopathic to the Elgin State Hospital. From thirty to fifty patients arrive each week in this way.

the questions and test instructions were given orally. The examiner read aloud the instructions for the different reasoning tests while the patient was asked to follow by reading either aloud or to himself the same instructions.

The order of giving the tests was alternated, one subject being given the tests of co-operation first and then the tests of ability, while the next patient was given the ability tests first and then the tests of co-operation.

2. Determining Reliability of Measures of Co-operation

Four estimates of the co-operativeness of each psychotic subject were secured. The first was a purely objective score based on the patient's performance on a number of so-called tests of co-operation. The second was based on the check list filled out for each patient by his ward physician and scored by the experimenter in numerical terms. The third and fourth estimates were obtained from the scoring of the graphic rating scales filled out independently by a supervisor and charge attendant respectively on each psychotic subject.

The objective tests have been given the label "I"; the doctors' ratings, "II"; the supervisors', "III"; and the charge attendants', "IV." The intercorrelations of the co-operation test scores and the ratings of co-operativeness for the two psychotic groups are as follows:

<u>Co-operation</u> <u>Measures</u>	<u>Dementia</u> <u>Praecox</u>	<u>Paretics</u>
I & II	+.74 $\pm$.03	+.76 $\pm$.07
I & III	+.76 $\pm$.03	+.61 $\pm$.08
I & IV	+.71 $\pm$.03	+.33 $\pm$.11
II & III	+.76 $\pm$.03	+.49 $\pm$.09
II & IV	+.65 $\pm$.04	+.30 $\pm$.11
III & IV	+.68 $\pm$.04	+.47 $\pm$.09

A study of these data shows that the correlation found between the co-operation measures in the schizophrenic group is definitely higher, with one exception (I & II), than the correlation found between these measures for the paretic group.

One possible explanation for this suggests itself immediately. The difference in the degree of co-operativeness between the extremes of the dementia praecox patients is a large and obvious one, so that within this wide range it was not necessary to discriminate fine differences in the degrees of co-operativeness.

With the parietic subjects, on the other hand, these differences are not so great, so that the estimates of degree of co-operation were necessarily on a smaller and hence less accurate scale. In other words, the higher correlation between the estimates for the schizophrenic group may be due to the greater heterogeneity of this group as far as co-operativeness is concerned. This relative heterogeneity of the schizophrenic group and relative homogeneity of the parietic group is shown in Figure 1.

The majority of the parietics were willing to do what was asked of them, if they were able to do it. Co-operation among the schizophrenic subjects, on the other hand, ranged from the excellent co-operation of the institutionally adjusted paranoid, who does what is asked of him and does it well (provided it does not touch on a complex or interfere in some way with his delusional system), to the lack of co-operation shown by a hebephrenic subject, who must be spoken to loudly and possibly more than once before he responds, who pays little attention to the requests made of him, who stops work which he has started because his attention has wandered off, or who does not even start to do the task.

The next question is the relative merit of the four different estimates of co-operativeness within each group. This question can be dismissed at once, as far as the schizophrenic group is concerned. The intercorrelation between the estimates is in every case high enough to warrant the inclusion of those estimates in the average. Certainly the agreement between the four groups, considering each one as a check upon the other, is sufficient to validate these estimates as measures of co-operation.

With the parietic group, however, less agreement is found between the measures of co-operativeness with the exception of the correlation between doctors' ratings and the objective test scores. The most marked disagreement is found in the attendants' estimates of co-operativeness correlated with the other estimates (see I & IV, II & IV, III & IV in Table I). From the comments and illustrative explanations given by several of the attendants at various times when they were using the rating scale, the examiner feared that they were not differentiating sharply between the co-operation which the demented parietic patient showed and his ability to understand and perform requests made of him. This occurred despite the fact that the explanatory notes accompanying the rating scale were drawn up with this particular distinction in mind. The supervisors, possibly because of their greater experience and ability to grasp the connotations involved, were not so inclined to make this mistake. The objective tests were selected, of course, with the express purpose of differentiating between lack of co-operation and lack of ability, and this probably explains the relatively

low correlation (+.33) between the employees' rating of co-operativeness and the objective test scores. The agreement between the doctors' estimates and the objective test scores is closer (+.76).

The possibility of discarding the employees' estimates in determining the average co-operation scores for the paretic subjects was not carried out, since, although the correlations with the three other estimates were not large (+.33, +.30, +.47), they were all definitely positive, and it was thought that they might be considered valid enough estimates to be included in the determination of the average co-operation scores of the individual paretic subjects.

VI. Results

A. Comparison of Co-operation Scores for the Three Groups

The average co-operation score for the schizophrenic group is definitely lower than the average for the other two groups.

Group	Test Score Aver- age	Doctors' Score Aver- age	Super- visors' Score Average	Attend- ants' Score Average	Total Score Aver- age
Schizophrenics	81	68	65	69	71
Paretics	96	94	88	81	88
Non-Psychotics	100	..	..	..	100

The relatively low co-operation scores for the dementia praecox group agree with the generally accepted concept of disinterest, apathy, and inattention as more or less typical characteristics of this psychosis. The majority of paretics, on the other hand, co-operated well, but, as might be expected with any psychotic group as compared with a non-psychotic group, some of the paretics were relatively disinterested or inattentive, bringing down the average score for this group to 88, as compared with the score of 100 for the non-psychotic group. The non-psychotics (who had shown their interest by volunteering to act as subjects) co-operated perfectly in the test situation.

Figure 1 gives a comparison of the average scores on the co-operation tests for the two psychotic groups. The paretic

AVERAGE COOPERATION SCORES FOR THE PSYCHOTIC GROUPS

-13-

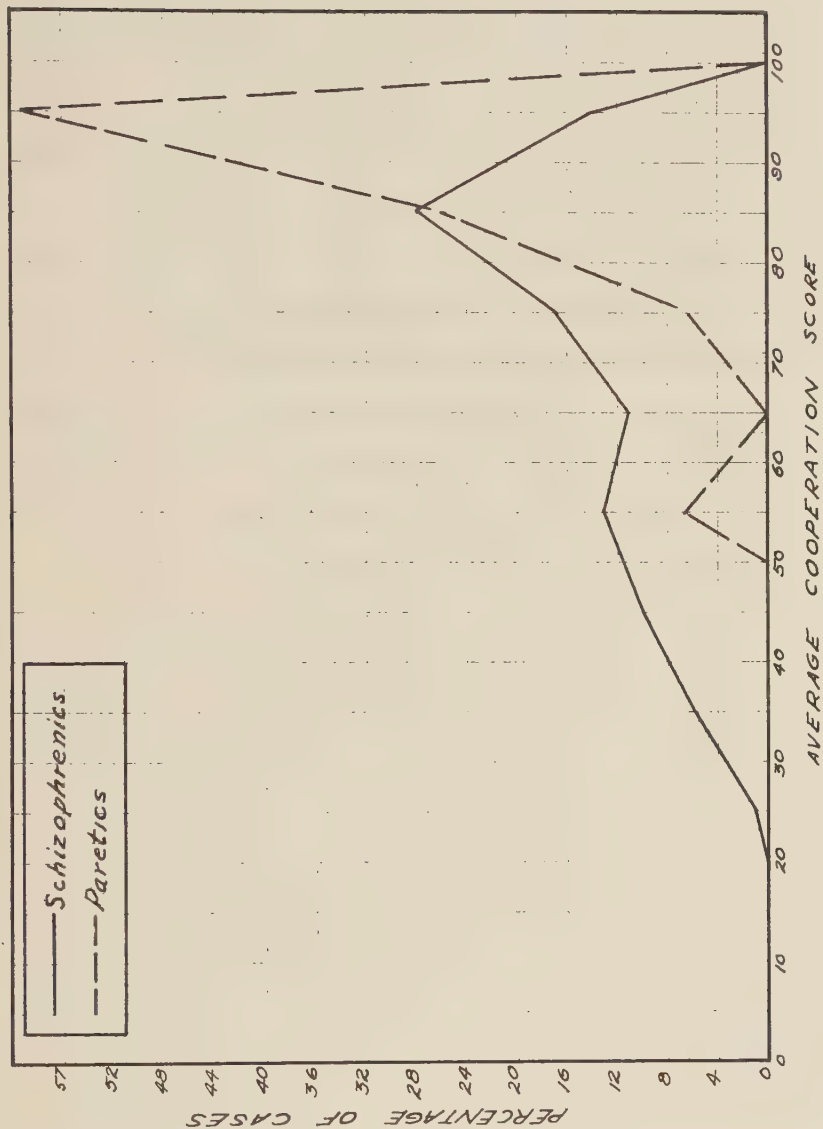


FIGURE 1

group is the more homogeneous as far as co-operativeness is concerned, the range being from 58 to 98. The range for the schizophrenic group is from 27 to 98. Both of the distributions show a skewing toward the lower scores, but this is much more pronounced in the paretic than in the praecox curve.

B. Comparison of Ability Scores for the Three Groups

The non-psychotic group, without a single exception, made the highest average scores on the individual tests and consequently the highest total scores. The schizophrenic group came next, with higher scores on all the tests than the paretics but with lower scores in each case than the non-psychotics.

Group	Memory Tests					Total Memory Score Average
	I	II	III	IV	V	
Dementia Praecox	14	10	12	5	10	52
Paretics	8	5	10	3	8	32
Non-Psychotics	16	17	17	14	17	76

Group	Reasoning Tests					Total Reasoning Score Average
	I	II	III	IV	V	
Dementia Praecox	8	5	5	6	9	33
Paretics	4	3	2	4	3	19
Non-Psychotics	15	12	10	9	13	61

In comparing the ability scores given above with the co-operation scores for the three groups, the change in relative standing of the two psychotic groups is noted. The praecox group that had been lowest in co-operation scores moves up to the middle, the paretics are down in the lowest position, while the non-psychotics hold their position of first place.

The shift between the two psychotic groups is due to the introduction of another factor in the determination of ability scores that was not present in the co-operation scores. The "dementia" of the paretic subjects definitely lowered their ability scores so sharply that this group drops to the lowest position

relative to the other groups. Co-operation also plays a part in the ability scores; hence the schizophrenics' level is not equal to the non-psychotics' level, but this loss is less than the loss due to the disability of the demented parietic groups; so that the schizophrenic and parietic groups change relative positions. Figure 2 when compared with Figure 1 illustrates this shift.

Figure 2 gives the distribution of total memory scores¹ for these groups. The distributions of scores on the individual tests give much the same picture and hence are not included here. Figure 3 gives the distribution of total reasoning scores for the three groups and presents the same general picture as Figure 2.

In both of these graphs the parietics' scores are grouped about the lower end of the scale, the non-psychotics at the upper end, with the schizophrenics' scores in the middle. The schizophrenics have the widest range, extending from the lowest level of the parietics up to very near the highest level reached by the non-psychotics. This indicates graphically the greater heterogeneity of the dementia praecox group as far as ability scores are concerned. Some in this group did as poorly as the most demented parietics, others in this same group did almost as well as the best in the non-psychotic group.

C. Correlation between Co-operation and Ability Scores

The following tables give the correlation coefficients found between degrees of co-operation and ability on the memory and reasoning tests for the three groups of subjects. These tables and the following figures (4 and 5) substantiate the thesis that, with schizophrenic subjects, there is a direct and close relationship between degree of co-operation and ability test scores, while with the parietic subjects this is not true.

The correlations found for the parietic group, while positive (with one exception), are so small as to be insignificant as far as indicating a direct relationship between co-operation and ability scores is concerned. This does not mean that degree of co-operation did not influence the ability scores, but that

¹ Each subject's five memory scores were added to get a total memory score, and the sum of the five reasoning scores gave a total reasoning score. The five tests in each group were arbitrarily considered to be of about equal difficulty, and hence the mere sum of the scores which give equal weight to all the tests was obtained.

DISTRIBUTION OF TOTAL MEMORY SCORES

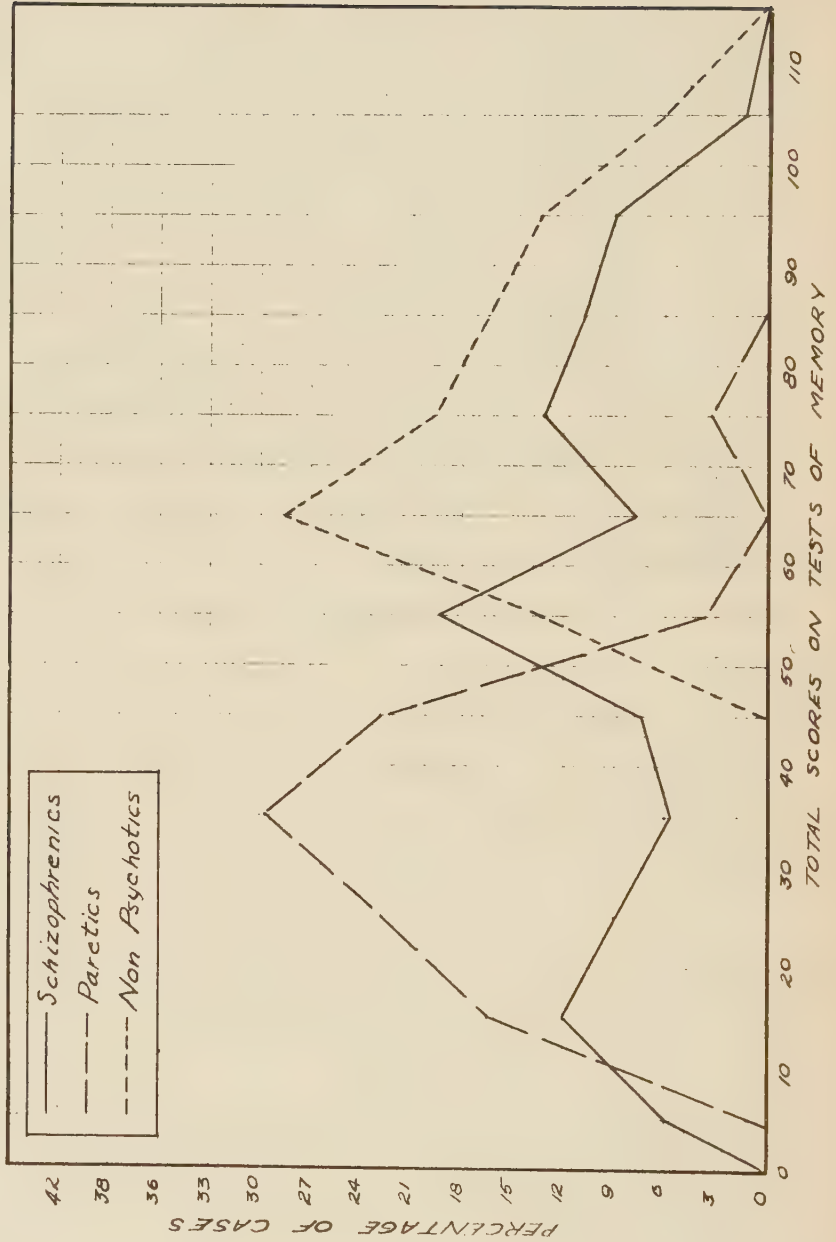


FIGURE 2

DISTRIBUTION OF TOTAL REASONING SCORES

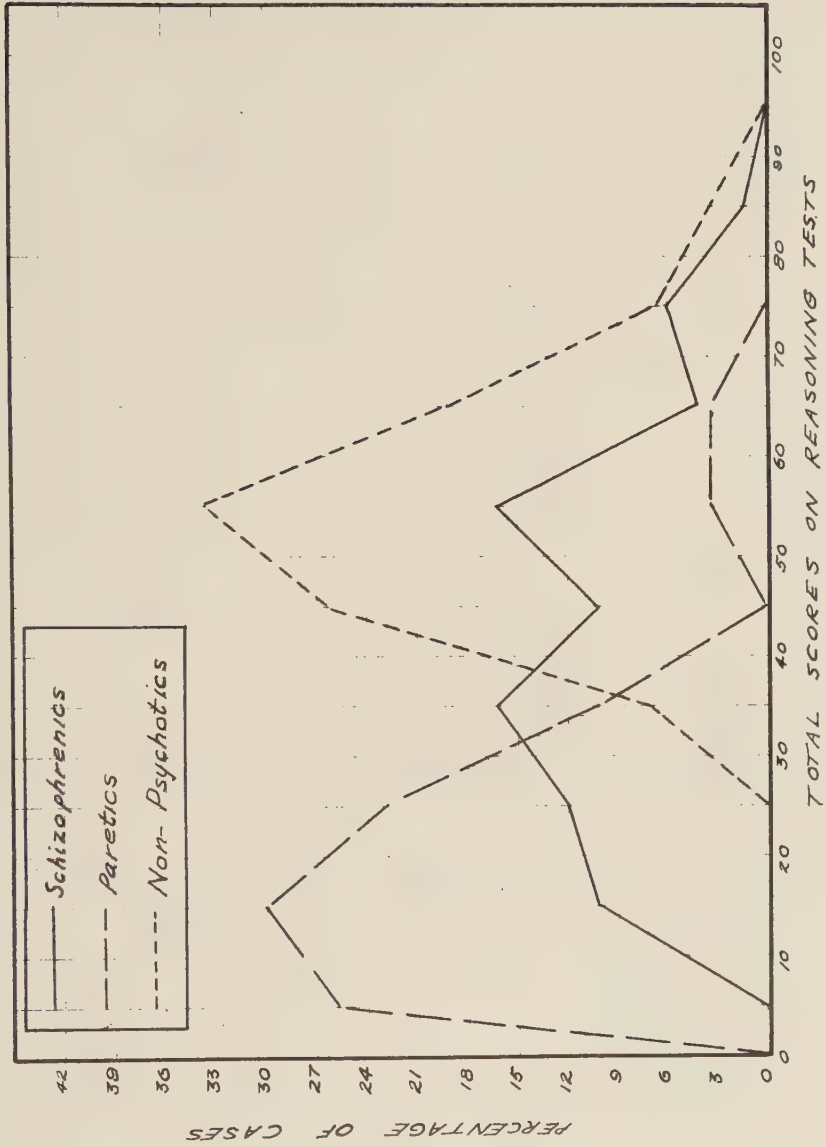


FIGURE 3

CORRELATION BETWEEN COOPERATION AND MEMORY SCORES



FIGURE 4

CORRELATION BETWEEN COOPERATION AND REASONING SCORES

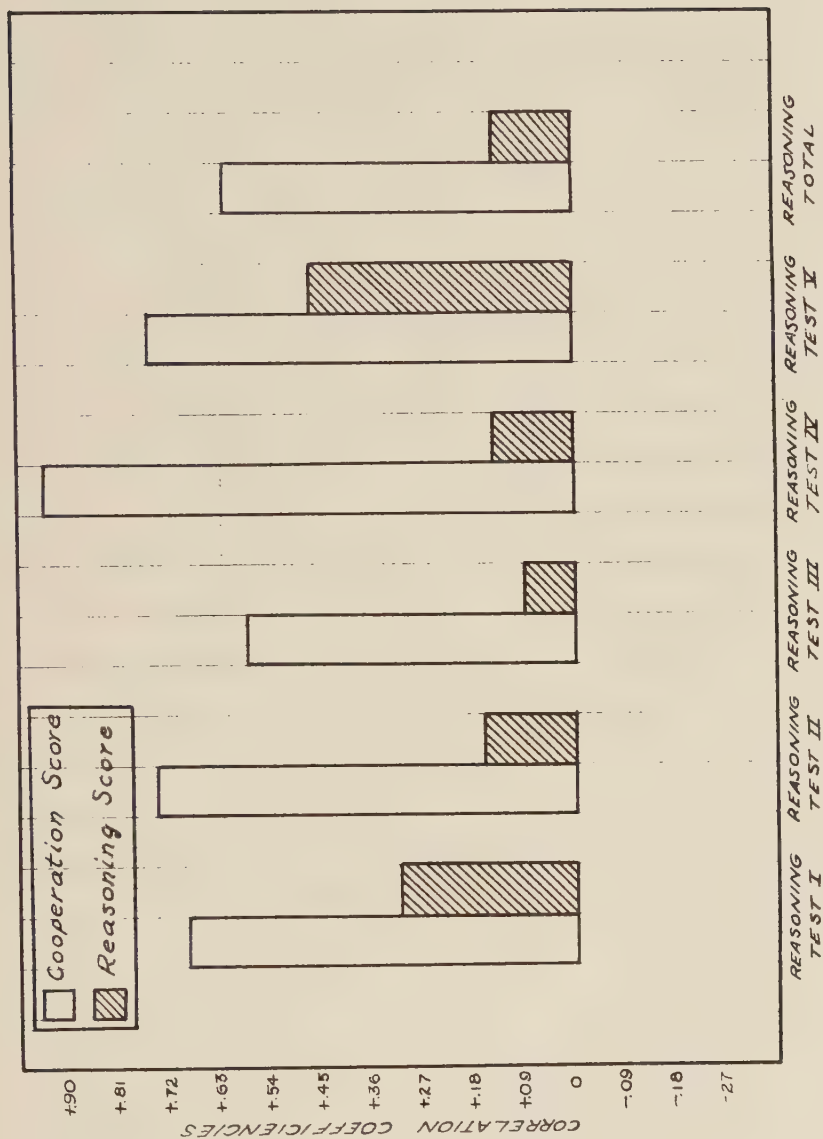


FIGURE 5

this influence was overshadowed by (because unrelated to) another very important factor, namely, the degree of dementia from which the patient suffered. The only negative correlation found was between degree of co-operativeness and Fernald's recognition of pictures test. No adequate explanation is offered, and it is suggested that it be considered possibly an artifact associated with the test, its presentation, or with the parietic subjects taking the test.

Memory Tests	Schizophrenics		Paretics	
I. Rote memory for words	+.60	±.04	+.28	±.11
II. Memory paragraph	+.76	±.03	+.25	±.11
III. Recognition test	+.75	±.03	-.12	±.12
IV. Paired associations	+.84	±.02	+.14	±.12
V. Retention of memory paragraph	+.76	±.03	+.30	±.11
Total memory score	+.68	±.04	+.15	±.12
Reasoning Tests				
I. Analogies	+.69	±.03	+.21	±.11
II. Arithmetic series	+.74	±.03	+.17	±.12
III. Similarities Test	+.58	±.04	+.09	±.13
IV. Arithmetic test	+.94	±.01	+.14	±.12
V. Essential difference test	+.75	±.03	+.46	±.11
Total reasoning score	+.62	±.04	+.14	±.12

All the non-psychotics co-operated so that all made perfect scores on the co-operation scale. Thus, variations in ability scores were in no way related to this identical co-operation score, a perfect one, made by every subject in the group. Consequently there could be no correlation because there were no differences in ability.

These results indicate that with the parietic and non-psychotic groups, although a high degree of co-operation is necessary to obtain a high test score, the reverse is not necessarily true. In other words, high test scores imply co-operation, but co-operation does not necessarily imply high test scores.

There was one factor in the test arrangements for this study that tended to lower the degree of correlation between co-operation and ability scores for the dementia praecox group. Certain of these praecox subjects were motivated enough to perform

well on the very simple tests of the co-operation scale, thereby attaining a test score indicating a high degree of co-operation. These same subjects, however, on the relatively more difficult ability tests showed less interest and attention, and they made a much poorer showing. This difficulty had been considered at the time the testing was started and an attempt made to overcome it to some extent. A rapport was sought that would motivate the patient, as the result of the encouragement and interest shown by the examiner, to exert himself on the ability tests as well as on the simpler co-operation tests. This motivation of the patient to try relatively as hard on the ability tests as on the other easier tests was not successful, of course, with all the praecox subjects. It was with these subjects (who performed the simple tests of co-operation well but who were not motivated enough to exert themselves on the ability tests that required sustained attention and interest), that the ratings of co-operation furnished by the supervisors and attendants were essential. The attendant and the supervisor have close and fairly constant contact with the patient on the ward as well as at work, and it was thought that the tendency referred to above (i.e., refusal to exert himself at any task that seemed relatively difficult or uninteresting) might influence these employees in their ratings of this type of patient.

D. Comparison of Initial and Retest Scores of Schizophrenics

Those dementia praecox subjects who were reported by the ward physician to have shown a definite change in attitude toward greater co-operativeness (within a relatively short length of time) were retested with parallel forms of the original ability tests. New estimates of co-operation were also secured for these patients. One of these patients, H.H., is described as more or less typical of the others in this group. He was diagnosed dementia praecox, catatonic type, and this diagnosis was later concurred in by the Elgin medical staff. According to the history he was twenty-seven years of age, had graduated from high school, and the first definitely psychotic symptoms had been noted by his family ten months previous to admission. He was tested within a few days after admission. The attendant from C-1 brought the patient to the psychologist's office attired in bath-robe and slippers. He was receiving daily packs because of a tendency toward impulsive violence and excitement. The patient made no response in answer to the introduction made by the attendant, but sat down quietly in the chair indicated to him. He answered a few introductory

remarks made by the psychologist in very low monosyllables, kept his head lowered on his chest so that his rather long hair, falling down, almost completely obscured his face. When the patient was asked his name he did not give a definite answer but said that he was called H____, but he was not sure whether that was really his name or not. When pressed for further information on this point he said he supposed that it was his name and anyway it did not matter what he was called because just giving something a different name did not change it. His reaction to the test situation was that of a very shy, perplexed and extremely self-conscious subject. He kept his hair or his hand over his face continually and talked in a very low voice. He always made some answer to the questions addressed to him, although he often appeared uncertain, as though he had difficulty in making up his mind just how to reply. His co-operation ratings were: test score, 83; doctor's rating, 65; supervisor's rating, 46; and attendant's score, 68; giving him an average of 61. On the memory tests his scores ranged from 0 to 16, with a total score of 34; on the reasoning tests the scores went from 2 to 10, with a total of 19.

Six weeks later he was retested because of improvement in his attitude and behavior on the ward. The patient had not been a suitable case for occupational or recreational classes but had received during this six weeks' period a course of fever therapy.

On retesting, the patient looked and acted much less distressed and perplexed than formerly. He kept his head up, although he retained certain mannerisms, such as holding his hand over his mouth as he talked and allowing his hair to fall untidily over his forehead and eyes. He spoke without the indecision characteristic of his former behavior, although his speech was still not spontaneous but only in answer to questions. He made an obvious effort to answer questions accurately and worked conscientiously on the reasoning tests during the time limit allowed, although his reaction to the test situation was still one of acquiescence and passive co-operation rather than of active interest in the tests themselves or in his ability to solve them. His second co-operation scores were: I = 100, II = 88, III = 85, IV = 74, giving a total of 84; while his memory score total rose to 71, and his reasoning score total to 47.

Thus the difference between retest and initial co-operation scores was +23; between retest and initial memory scores the difference was +37; and between retest and initial reasoning scores the difference was +28.

The results tabulated in the following give the differences between the retest and the initial scores for the seventeen subjects who were retested.

Co-operation	Memory Total	Reasoning Total
*14	* 8	*10
*33	*22	*26
*18	*32	*33
*32	*61	*39
*12	*22	*15
*36	*61	*38
*11	*17	*15
*23	*37	*28
*28	*56	*49
*22	*12	*15
*31	*61	*39
*28	*11	*34
*56	*27	*13
*47	*44	*42
*44	*37	*48
*13	- 5	* 5
*17	*24	*24
Av. Diff. *27.3	*31.0	*27.8

These results are definite and consistent. Within a period of from two to twelve weeks these patients had improved in co-operativeness from an average of 60 points to an average of 87 points. At the same time they improved on the memory tests from an average total of 38 to 69 points, and on the reasoning tests from 23 to 51 points on the total average. This improvement is shown graphically in Figures 6 and 7.

These findings corroborate the thesis that the so-called "deterioration" in schizophrenic patients, indicated by their lack of ability on psychiatric and psychometric tests, can not be due to a pathological involvement and destruction of cortical function, as has been demonstrated in advanced cases of paresis, for instance.

The direct and positive relationship between change in co-operation and accompanying change in ability level stresses the importance of the role co-operation plays; while, on the other hand, the very great improvement in ability indicated in the test scores could not have been achieved (especially in such a relatively short time) if there had been definite organic pathology with destruction of cortical function. This is contrary to Kraepelin's stand that the "dementia" found in dementia

COMPARISON OF COOPERATION AND MEMORY SCORES ON INITIAL TESTS AND RETESTS

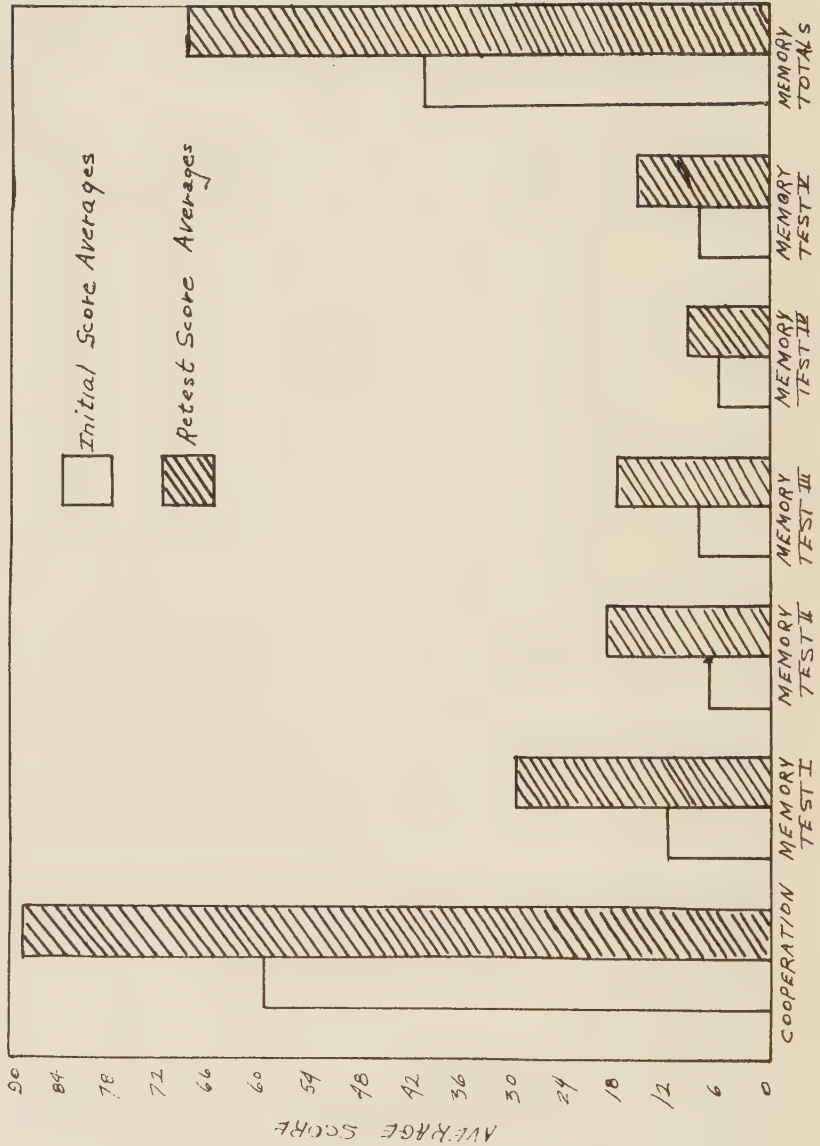


FIGURE 6

COMPARISON OF COOPERATION AND REASONING SCORES ON INITIAL TESTS AND RETESTS

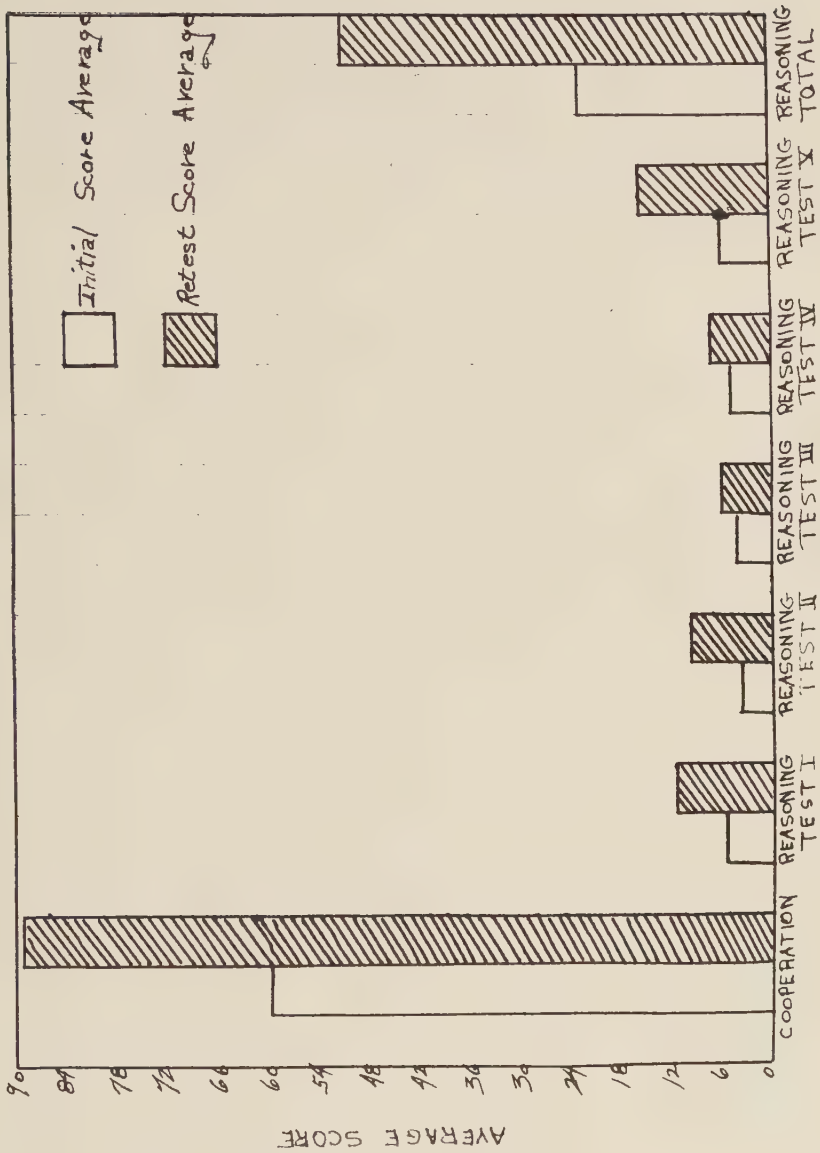


FIGURE 7

praecox "is similar to other forms of dementia, such as are known to us as the result of paralysis (paresis), senility or epilepsy" (10). It is also contrary to Dr. Babcock's conclusion that "the intellectual defect which Kraepelin considered to exist in the very earliest stages, though the fact was not then clearly demonstrable, not only exists but can also be measured."

The direct relationship between increase in co-operation and increase in ability scores indicates that the so-called "dementia" in schizophrenic subjects is an apparent rather than a true one, due to the apathy, inattention, and lack of motivation of the patient in the test situation.

E. Relationship of Test Scores to Duration of Psychosis

Correlating duration of the psychosis (dementia praecox) with total memory scores gives a coefficient of $-.13$, $\pm .06$; with scores on the reasoning tests a coefficient of $-.12$, $\pm .06$. This is of interest, since, if Kraepelin's concept of dementia praecox as a progressively deteriorating psychosis were correct, one would expect a negative correlation high enough to indicate definitely this relationship between length of psychotic condition and amount of deterioration. The coefficients obtained in this study, however, are too low to indicate any significant relationship.

F. Co-operation and Ability Scores in Relation to Type of Schizophrenia

The following is self-explanatory.

Type	Number of Cases	Average Co-operation Score	Average Memory Score	Average Reasoning Score
Paranoid	34	86.5	75.6	51.9
Simple	4	83.0	65.0	43.2
Undetermined	15	67.7	44.4	27.2
Catatonic	22	66.7	47.3	27.1
Hebephrenic	25	54.0	25.7	11.0

The types are ranked in order from those having the highest co-operation scores to those with the lowest. The arrangement for the ability scores follows this same order with but one minor exception.

Figure 8 shows graphically the relation between type of

FREQUENCY DISTRIBUTION OF SCORES MADE BY SCHIZOPHRENIC PATIENTS CLASSIFIED AS TO TYPE

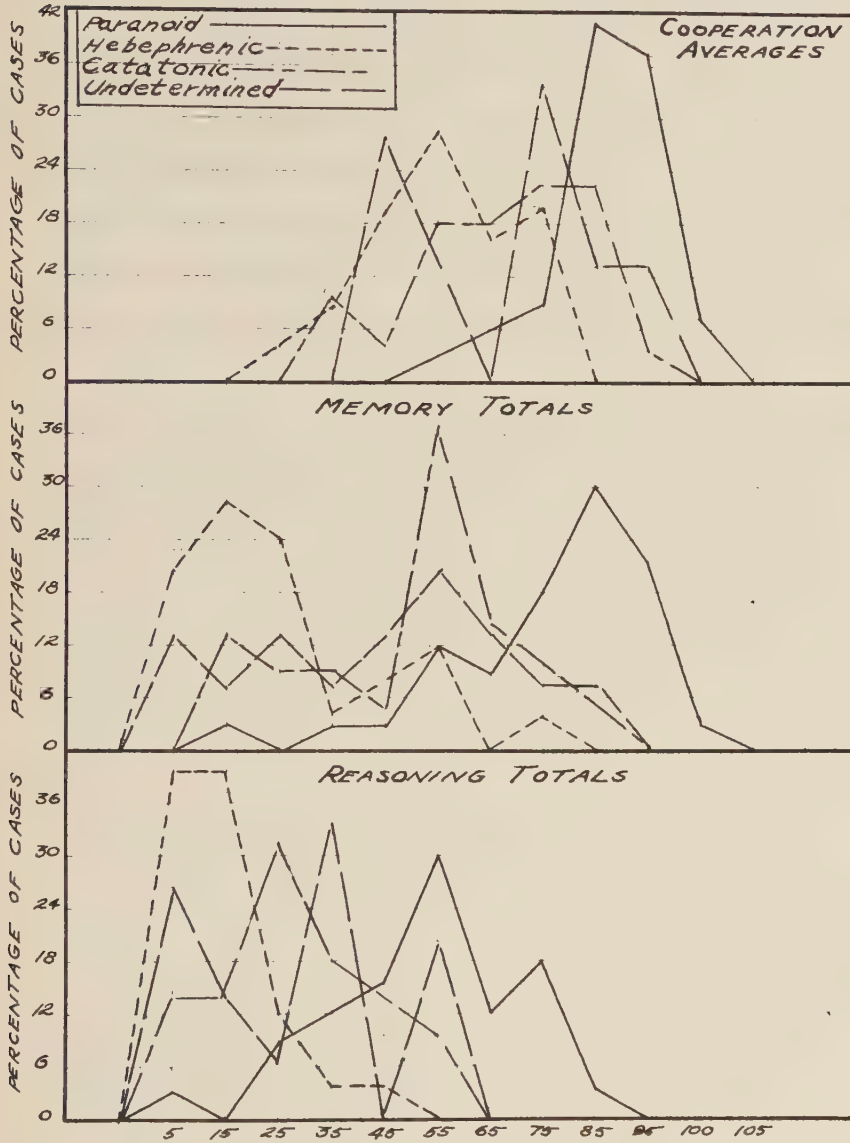


FIGURE 8

dementia praecox and co-operation and ability scores.

In the memory scores the average for the catatonics is higher than that for the "undetermined," although their average co-operation score is lower. In all the averages the paranoids rank higher than any of the other types. This agrees with the frequently expressed observation that the paranoid cases are usually more efficient intellectually, show less overt evidence of their psychotic state, except in the fields of their delusional interests, and are more interested and in better contact with reality than the other well defined types. The hebephrenics are, on the other hand, characterized by extreme indifference, dis-interest, and loss of contact with reality, which is evidenced in the foregoing table by their relative standing (lowest in the list) among the other types of schizophrenics.

VII. Statement of Results

A. The schizophrenic subjects as a group were less co-operative than the syphilitic meningo-encephalitics (paretics). The non-psychotics all classified at the maximum level of co-operativeness.

The schizophrenic group was a much more heterogeneous one as far as co-operativeness was concerned than the other psychotic group (paretic). The non-psychotic group all classified at the same point, indicating complete homogeneity in respect to co-operativeness.

B. The non-psychotic group made definitely higher ability scores than either of the psychotic groups. The paretics' scores were bunched at the lower end of the scale, the non-psychotics at the upper end, the dementia praecox group ranging from the lowest paretic extreme in score to very near the highest non-psychotic score.

C. There was a marked difference between the relationship of ability scores and co-operativeness for the three groups. The scores made by the praecox group were not only influenced by the degree of co-operation but were largely dependent upon it.

The positive, though small, correlation between paretic ability and co-operation indicates, as might be expected, that degree of co-operativeness also influenced to some extent the memory and reasoning scores. The low correlation coefficient for the paretic group indicates that the amount of intellectual deterioration the paretic patient had experienced was largely responsible for the pathologically low scores made on the ability tests.

The non-psychotic group were all motivated to do the best they could in this particular test situation, so that differences

in memory and reasoning scores may be taken as definitely indicative of differences in memory and reasoning ability.

D. The second scores of the schizophrenic patients, re-tested because they had shown an increase in co-operativeness following the initial testing period, were definitely higher than the first scores. The increase in ability scores was directly connected with increase in co-operation scores. This refutes definitely the theory that the so-called "dementia" of dementia praecox subjects is similar to that "observed in other diseases where organic deterioration rather than mental habituation is the accepted basis of abnormality"(1).

E. The correlation of ability scores with duration of psychosis for the schizophrenic subjects yielded negative but very low coefficients. This does not corroborate Kraepelin's concept of dementia praecox as a progressively dementing psychosis. To agree with his concept one would expect a negative correlation high enough to indicate definitely this relationship between length of psychotic condition and amount of deterioration.

F. Those subjects in the schizophrenic group with a diagnosis of paranoid type were, on the average, the most co-operative and made the highest average ability scores. The few cases of simple type included in this study come next, then the undetermined type, catatonic, and last the hebephrenic type.

VIII. Conclusions

The type of inability displayed by dementia praecox patients on psychiatric and psychometric examinations is not directly due to an organic pathology causing intellectual deterioration. It is due, on the other hand, to certain psychological factors such as apathy, disinterest, inattention, abulia, etc., which in turn may have either a physiological or a psychological basis, or both.

IX. Appendixes

A. Objective Tests of Co-operation

1. Selection and Weighting of Co-operation Tests

Reliable, objective measures of co-operation are necessarily so simple that it can be safely assumed that all the subjects are able to answer correctly whether they do so or not. Since with many parietic subjects the presence of intellectual deterioration is acknowledged, and with the schizophrenic subjects it is a matter of controversy, the tests had to be carefully selected so that they were a measure of whether the patient was motivated to do the task and not whether he was able to do it. The tests had to be simple enough that the demented subject had the ability to solve them, so that if he did not, it might be taken as an indication of a lack of co-operation.¹

The tests finally chosen were of different types, and probably not all of equal effectiveness in determining the degree of co-operation the subject showed. The problem of assigning appropriate weights to the individual tests in the battery was solved by having members of the medical staff at the hospital rate the tests in order of their importance, as "tests of co-operation." The following ratings were obtained.

1

If the tests are difficult for the acknowledgedly deteriorated parietic to answer, the results would be weighted in favor of Kraepelin's concept, since there would be a smaller difference between the co-operation and efficiency scores for the parietic group than would otherwise be the case.

Raters	T E S T S									
	I	II	III	IV	V	VI	VII	VIII	IX	X
A	1.0	10.0	2.0	6.0	4.0	7.0	9.0	5.0	8.0	3.0
B	1.0	9.0	4.0	8.0	3.0	5.0	7.0	2.0	10.0	6.0
C	1.0	5.0	4.0	9.0	3.0	8.0	7.0	2.0	10.0	6.0
D	2.0	9.0	4.0	6.0	3.0	8.0	7.0	5.0	10.00	1.0
E	1.0	4.0	2.0	10.0	3.0	6.0	7.0	5.0	9.0	8.0
F	1.0	4.0	6.0	7.0	2.0	8.0	9.0	3.0	10.0	5.0
G	1.0	8.0	6.0	10.0	3.0	7.0	5.0	4.0	9.0	2.0
H.	1.0	8.0	2.0	9.0	3.0	5.0	7.0	6.0	10.0	4.0
I	1.0	9.0	2.0	3.0	5.0	7.0	8.0	6.0	10.0	4.0
J	2.0	8.5	3.0	7.0	4.0	5.0	10.0	1.0	8.5	6.0
K	3.0	9.0	6.0	4.0	1.0	7.0	5.0	8.0	10.0	2.0
L	1.0	9.0	2.0	7.0	3.0	8.0	4.0	6.0	10.0	5.0
Average Rank	1.3	6.9	3.5	7.1	3.0	6.7	7.0	4.9	9.5	4.4

Using these data, the weighting of each test was roughly approximated on the basis of its average rank value.

Tests	Rank	Number of Items		Weight		Weighted Score
I	1.3	5	x	6	=	30
II	6.9	5	x	1	=	5
III	3.5	5	x	3	=	15
IV	7.1	0	x	1/10	=	4
V	3.0	3	x	4	=	12
VI	6.7	4	x	2	=	8
VII	7.0	4	x	1	=	4
VIII	4.4	5	x	2	=	10
IX	9.5	10	x	1/5	=	2
X	4.4	40	x	1/4	=	10
						100 maxi- mum score

The number of items in each test and the weighting were arranged so that the maximum score on the ten tests was 100. This was accomplished so that the scores could be compared directly with the scores for the other measures of co-operation, the maximum score for each being 100.

2. Tests of Co-operation

a. Questions of personal information

- 1) What is your name?
- 2) Do you like to sing?
- 3) Where is your home?
- 4) Do you like to dance?
- 5) Are you married?

Alt. Have you had any visitors this week?

Scoring.--Maximum score = 10. If answer is not given within five seconds the question is repeated and only half-credit given for the answer.

b. Vocabulary

- 1) Gown
- 2) Envelope
- 3) Orange
- 4) Tap
- 5) Roar

Alt. Bonfire

Scoring.--A simple explanation as well as a formal definition considered satisfactory. Maximum score = 5.

c. Naming objects

- 1) Pencil
- 2) Key
- 3) Watch
- 4) Book

Alt. Pen

Scoring.--Naming the object or explaining its use considered a correct answer. Maximum score = 15.

d. Maller's Dash Test - Opposites Form

Subject is instructed to make a horizontal line beneath each vertical line and a vertical line beneath each horizontal line. Illustrations given.

Scoring.--Number of correct dashes minus number of incorrect times 1/10. Maximum score = 4.

e. Aesthetic Discrimination

Test at 5th year level in Stanford Binet.

Scoring.--Each correct choice given score of 4. Maximum score = 12.

f. Omissions Test

Test at 6th year level in Stanford Binet.

Scoring.--Each correct answer given score of 2. Maximum score = 8.

g. Tapping Test

Experimenter taps in irregular rhythm on top of desk.

Subject asked to name total number of taps.

1 - 3 - 2 - 1

2 - 1 - 3 - 2

1 - 1 - 2 - 1

2 - 2 - 3 - 1

Scoring.--Number of correct answers. Maximum score = 4.

h. Ferguson Form Board III

Examiner says, "Please put these blocks back into place in the board as quickly as possible. If you put them in correctly they will fill up all the empty spaces." The patient is not scored on how well he performs the test but on his reaction to the situation, which is classified into one of the following levels:

1) Does not look at or touch blocks or else picks them up and lays them back down on the desk without making any effort to fit them into spaces on the board.

2) Slides the blocks around over the board, but in an aimless fashion so that the fitting of a block into its appropriate place is the result of chance rather than design.

3) Makes some slight attempt to place blocks in empty places but pays no attention to form or size relationships. May flop a large block down on a space fitting a block one-third as large. Superior to level 2, however, in that the patient tries to fill the empty spaces with blocks instead of just sliding them haphazardly around the board.

4) Shows a definite degree of purpose and interest in handling blocks. If one attempt proves unsuccessful tries to fit block into another place rather than automatically repeating attempt to jam block into a space obviously unsuitable.

5) Differs from level 4 in that patient attempts to follow directions to put the blocks in as quickly as possible.

Scoring.--Below level 1 = 0; level 1 = 2; 2 = 4; 3 = 6; 4 = 8; 5 = 10. Maximum score = 10.

i. Continuous Subtraction

Subtracting 2 from 20 and from each remainder until 0 is reached. Scoring = number of correct subtractions x 1/5. Maximum score = 2.

j. Maller's Letter Test - Similar Form

Subject is instructed to write capital B under every capital B and small b under every small b. Illustrations given. Scoring = number of correct letters minus number of wrong ones times 1/4. Maximum score = 10.

B. Check List to Be Filled Out by Ward Physician

Trait Name	1	2	3	4	5	Score
1. Emotional reaction						
2. Alertness						
3. Adaptability						
4. Interest						
5. Compliance						
6. Initiative in conversation						
7. Motivation						
8. Spontaneity						
9. Movement						
10. Contact with environment						
11. Indifference						
12. Distrust						
13. Incoherence						
14. Inaccessibility						
15. Irrelevancy						
16. Apathy						
17. Self-absorption						
18. Inattention						
19. Evasiveness						
20. Listlessness						

TOTAL

The ward doctor was asked to place a check mark in one of the five columns opposite each trait name. The columns from one through five represent varying degrees of the trait named. Thus, 1 = marked degree, and 5 = extremely little or none at all.

Scoring.--The checks in the first column through Number 10 get a score of 5 each; the checks from Number 11 on receive a score of 1 each. In column 2 the checks through Number 10 get a score

of 4; from Number 11 on, a score of 2. In column 3 all the checks get a score of 3. In column 4 the checks through Number 10 get a score of 2; from Number 11 on, a score of 4. In column 5 the checks through Number 10 get a score of 1; from Number 11 on, a score of 5.

C. Graphic Rating Scale of Co-operation

A copy of the following explanation of co-operation levels was given to the supervisors and attendants rating the patients. All questions and comments were answered as specifically as possible, and then the rater was asked to indicate his opinion of the patient's co-operativeness on the rating scale.

Co-operation, as the term is used here, means the motivation to secure self-esteem and the approval of others by performing in a given situation as well as possible; i.e., to be interested in carrying out requests and instructions to the best of one's ability.

The accompanying rating line represents different degrees of co-operativeness from very good co-operation at one extreme to very poor co-operation at the other. The following paragraphs give a descriptive picture of the two extremes of the line to aid you in rating.

Very good co-operation.--Patient makes a definite effort to do the best he can in any situation. He is interested in securing the approval of others for the things he does and the way he does them. Directions are listened to carefully and carried out as well as the patient is able. Gives definite impression of wishing to co-operate with the attendants and others in authority, even if his mental condition is such that his attempts are ineffectual. When asked to do something quickly, the patient tries to speed up all his movements in an effort to work quickly. Does difficult or uninteresting assignments to the best of his ability.

Very poor co-operation.--Patient definitely lacks the motivation to do the best he can in a given situation. Answers questions or performs simple tasks that he has the ability to do only if he wishes to do them, and is not influenced by the orders or requests of others. He may refuse to answer simple questions or to come at the attendant's call, to dress or undress as instructed, etc. He is inattentive to the wishes of others and reacts as they request only if he, himself, is interested in doing so. Work or any sort of activity that the patient considers difficult or uninteresting, he simply refuses to do.

Excellent	Good	Fair	Poor	Very Poor
-----------	------	------	------	-----------

Please indicate with a small check on the line the degree of co-operation the patient shows in your estimation.

Scoring.--The line is laid out numerically. The range of excellent is from 85 to 100; good from 70 to 85; fair from 55 to 70; poor from 40 to 55; and very poor from 25 to 40.

D. Tests of Intellectual Ability

I. Tests of Memory

A. Rote Memory for Words (Adapted from Pyle's Test [3])

1. Initial Form

street	spoon	ground	desk	ball	coat
ink	horse	clock	milk	cup	girl
lamp	chair	boy	hand	glass	house
	stove	chalk	card	hat	salt
		book	floor	fork	glove
			cat	pole	watch
				cloud	box
					mat

2. Parallel Form

clock	knife	blotter	water	plate	rose
pen	sheep	glass	boot	paint	paper
sace	book	bird	board	glove	door
	light	pencil	cat	brown	pin
		bar	wall	card	muff
			hair	mouse	ring
				club	year
					cigar

Examiner reads list of words and asks subject to repeat as many of the words in their correct order as he can. If he forgets a word he is to indicate the omission and go on. Examiner writes down words as he repeats them. Scoring.-- 1 for each correct word in its correct position; .5 for correct word not in its right position.

B. Immediate Reproduction of Paragraph (Adapted from Stanford Binet Scale Year X)

1. Initial Form

"New York, September 5th. A fire last night burned three houses near the center of the city. It took some time to

put it out. The loss was fifty thousand dollars, and seventeen families lost their homes. In saving a girl who was asleep in bed, a fireman was burned on the hands."

2. Parallel Form (16)

"December 6th. Last week a river overflowed in a small town ten miles from Springfield. Water covered the streets and entered the houses. Fourteen persons were drowned, and six hundred caught cold because of the dampness and cold weather. In saving a boy who was caught under a bridge, a man was cut on the hands."

Examiner repeats the paragraph out loud and asks subject to tell, in his own words, as much as he remembers about it. Score is the number of correct "memories." Examiner repeats the paragraph, warns the subject that later on she is going to ask him to tell as much as he remembers about the story.

C. Recognition of Pictures (Fernald's Test)

A series of ten pictures are shown to the subject, one at a time; then these cards are mixed up with ten additional cards and the subject is asked to answer on re-showing of the twenty cards with "Yes" if he saw the card before and "No" if he did not see it before. Score is number of correct minus number of incorrect answers.

D. Paired Associates Test (Adapted from Babcock Deterioration Scale)

1. Initial Form

letter	road
table	dog
sky	apple
snow	chair
desk	barn
book	cheese
ink	glass
pencil	umbrella
watch	hay
coat	ring

2. Parallel Form

stove	clock
peach	glove
muff	bird
screen	book
tractor	carpet
ground	box
color	lock
girl	blotter
chain	orange
rubber	word

The examiner explains that she is going to read a pair of words together, then another pair, and another, etc. The subject is to listen closely and try to remember which words go together, for, when she has finished the list, the examiner is going to read the first word of each pair and ask the subject to name the word that goes with it. A score of 2 is given for each correct response.

E. Retention of Memory Paragraph

Subject asked to recall as much as he can of story he was told some time before (Test B). Score = number of correct "memories."

II. Tests of Reasoning

A. Analogies Test

1. Initial Form - Test 7 - Otis Adv. Exam. A
2. Parallel Form - Test 7 - Otis Adv. Exam. B

B. Arithmetical Series Test

1. Initial Form - Test 6 - Army Alpha - Form 8
2. Parallel Form - Test 6 - Army Alpha - Form 6

C. Similarities Test

1. Initial Form - Test 8 - Otis Adv. Exam. A.
2. Parallel Form - Test 8 - Otis Adv. Exam. B.

D. Arithmetic Problems

1. Initial Form - Test 5 - Otis Adv. Exam. A.
2. Parallel Form - Test 5 - Otis Adv. Exam. B

E. Essential Differences Test

1. Initial Form - Shakow-Kent (5)
2. Parallel Form (Adapted from 1)

Apple	carrot	peach	pear
finger	toe	nose	hair
trousers	shoe	coat	vest
hair	wolf	cat	bear
island	continent	peninsula	sea
short	soft	long	tall
piano	saxophone	stage	horn
window	door	sidewalk	porch
moan	whine	scream	speak
ice	snow	rain	sleet
ocean	island	lake	sea
hat	collar	bonnet	cap
work	run	sleep	play
electricity	steam	gasoline	iron
Cincinnati	Chicago	Idaho	Seattle
candy	milk	cake	bread
white	yellow	blonde	green

beech	forest	oak	pine
postoffice	library	court house	garage
boat	train	automobile	motorcycle
cigar	smoke	cigarette	pipe
tent	house	lot	flat
bitter	sour	sweet	white
tree	bush	vine	flower
sun	sky	planet	moon

The original directions for administering the foregoing tests called for the subject to read silently to himself and then underline or write in the correct answer. With psychotic subjects, however, more reliable results are obtained by the examiner's direct participation in the test administration, if possible. Thus the responsibility for correct conduct of the test, after its initial explanation, is not left entirely to the patient. For this reason, in all the following tests the examiner sat beside the subject, read once aloud each problem and the possible answers, if a choice were given, and the patient was only required to signify the answer. The patient could read and re-read the problem to himself as often as he wished, of course, but as soon as he gave an answer the examiner went on to the next part. This prevented the patient from stopping for some time after completion of one problem before starting on the next. In some cases, and particularly with the non-psychotic group, where such precautions were obviously unnecessary, the examiner let the subject read to himself and then indicate the answer. For each of these tests the scoring is the same, i.e., the number of correct responses the subject makes within a two-minute period.

APPENDIX E

1. Frequency Tables of Co-operation Scores

TABLE I-a
SCORES MADE ON OBJECTIVE TESTS OF CO-OPERATION

Score	Number of Cases		
	Schizophrenic	Paretic	Non-psychotic
100	28	17	30
90 - 99.9	18	11	..
80 - 89.9	16	1	..
70 - 79.9	13	1	..
60 - 69.9	6	..	..
50 - 59.9	6	..	..
40 - 49.9	3	..	..
30 - 39.9	8	..	..
20 - 29.9	2	..	..
total	100	30	30

TABLE II-a
DOCTORS' RATINGS OF CO-OPERATIVENESS

Score	Number of Cases	
	Schizophrenic	Paretic
100	1	3
90 - 99.9	26	18
80 - 89.9	13	7
70 - 79.9	11	1
60 - 69.9	12	..
50 - 59.9	16	..
40 - 49.9	7	1
30 - 39.9	12	..
20 - 29.9	2	..
Total	100	30

TABLE III-a
SUPERVISORS' RATINGS OF CO-OPERATIVENESS

Score	Number of Cases	
	Schizophrenic	Paretic
100	1	..
90 - 99.9	10	17
80 - 89.9	20	7
70 - 79.9	18	2
60 - 69.9	9	1
50 - 59.9	19	2
40 - 49.9	10	1
30 - 39.9	8	..
20 - 29.9	5	..
Total No. of Cases	100	30

TABLE IV-a
ATTENDANTS' RATINGS OF CO-OPERATIVENESS

Score	Number of Cases	
	Schizophrenic	Paretic
100	3	..
90 - 99.9	19	14
80 - 89.9	17	7
70 - 79.9	14	3
60 - 69.9	13	1
50 - 59.9	11	2
40 - 49.9	16	2
30 - 39.9	4	1
20 - 29.9	3	..
Total No. of Cases	100	30

TABLE V-a
AVERAGE CO-OPERATION SCORES

Score	Number of Cases	
	Schizophrenic	Paretic
90 - 99.9	14	18
80 - 89.9	28	8
70 - 79.9	17	2
60 - 69.9	11	..
50 - 59.9	13	2
40 - 49.9	10	..
30 - 39.9	6	..
20 - 29.9	1	..
Total No. of Cases	100	30

2. Frequency Tables of Memory Scores

TABLE I-b
SCORES ON MEMORY TEST A

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
22 - 23.9	2	..	4
20 - 21.9	8	..	1
18 - 19.9	13	..	4
16 - 17.9	14	1	9
14 - 15.9	17	1	6
12 - 13.9	12	1	5
10 - 11.9	9	5	1
8 - 9.9	7	9	..
6 - 7.9	3	5	..
4 - 5.9	7	5	..
2 - 3.9	2	2	..
0 - 1.9	..	1	..
Total No. of Cases	100	30	30

TABLE II-b
SCORES ON MEMORY TEST B

Score	Number of Cases		
	Schizophrenic	Parctic	Non-Psychotic
18 - 19.9	2	..	1
16 - 17.9	14	..	4
14 - 15.9	9	2	7
12 - 13.9	7	1	9
10 - 11.9	18	3	4
8 - 9.9	12	5	3
6 - 7.9	6	3	2
4 - 5.9	11	5	..
2 - 3.9	12	5	..
0 - 1.9	9	6	..
Total No. of Cases	100	30	30

TABLE III-b
SCORES ON MEMORY TEST C

Score	Number of Cases		
	Schizophrenic	Parctic	Non-Psychotic
20	17	..	6
18	16	1	8
16	13	3	10
14	7	1	4
12	6	5	2
10	6	7	..
8	8	..	..
6	1	6	..
4	5	6	..
2	4	1	..
0	17	..	..
Total No. of Cases	100	30	30

TABLE IV-b
SCORES ON MEMORY TEST D

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
20	5	..	5
18	4	..	2
16	8	..	4
14	8	..	6
12	9	..	4
10	5	2	6
8	9	1	3
6	7	2	..
4	13	4	..
2	5	4	..
0	27	17	..
Total No. of Cases	100	30	30

TABLE V-b
SCORES ON MEMORY TEST E

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
20 - 21.9	3	..	4
18 - 19.9	10	..	2
16 - 17.9	12	..	6
14 - 15.9	11	2	11
12 - 13.9	12	4	5
10 - 11.9	7	8	2
8 - 9.9	11	4	..
6 - 7.9	5	4	..
4 - 5.9	6	3	..
2 - 3.9	8	1	..
0 - 1.9	15	4	..
Total No. of Cases	100	30	30

TABLE VI-b
TOTAL SCORES ON MEMORY TESTS

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
100 - 109.9	1	..	2
90 - 99.9	9	..	4
80 - 89.9	11	..	5
70 - 79.9	13	1	6
60 - 69.9	8	..	9
50 - 59.9	19	1	4
40 - 49.9	7	7	..
30 - 39.9	5	9	..
20 - 29.9	9	7	..
10 - 19.9	12	5	..
0 - 9.9	6	..	..
Total No. of Cases	100	30	30

3. Frequency Tables of Reasoning Scores

TABLE I-c
SCORES ON REASONING TEST A

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
22 - 23.9	..	..	1
20 - 21.9	3	..	3
19 - 19.9	2	..	2
16 - 17.9	4	..	3
14 - 15.9	10	1	8
12 - 13.9	8	1	3
10 - 11.9	8	2	6
8 - 9.9	9	1	2
6 - 7.9	10	5	2
4 - 5.9	12	2	..
2 - 3.9	12	9	..
0 - 1.9	22	9	..
Total No. of Cases	100	30	30

TABLE II-c
SCORES ON REASONING TEST B

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
14 - 15.9	1	..	2
12 - 13.9	6	..	7
10 - 11.9	9	1	10
8 - 9.9	16	..	3
6 - 7.9	14	1	7
4 - 5.9	19	6	1
2 - 3.9	17	11	..
0 - 1.9	18	11	..
Total No. of Cases	100	30	30

TABLE III-c
SCORES ON REASONING TEST C

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
16 - 17.9	1	..	1
14 - 15.9	4	..	3
12 - 13.9	5	..	4
10 - 11.9	12	1	8
8 - 9.9	11	2	9
6 - 7.9	13	1	5
4 - 5.9	10	3	..
2 - 3.9	7	4	..
0 - 1.9	37	19	..
Total No. of Cases	100	30	30

TABLE IV-c
SCORES ON REASONING TEST D

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
12 - 13.9	4	..	2
10 - 11.9	10	1	5
8 - 9.9	22	5	16
6 - 7.9	19	5	6
4 - 5.9	22	10	1
2 - 3.9	12	5	..
0 - 1.9	11	4	..
Total No. of Cases	100	30	30

TABLE V-c
SCORES ON REASONING TEST E

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
20 - 21.9	2	..	..
18 - 19.9	8	..	1
16 - 17.9	8	1	3
14 - 15.9	11	1	1
12 - 13.9	8	..	8
10 - 11.9	17	3	6
8 - 9.9	10	2	7
6 - 7.9	8	4	2
4 - 5.9	11	5	2
2 - 3.9	8	9	..
0 - 1.9	9	5	..
Total No. of Cases	100	30	30

TABLE VI-c
TOTAL SCORES ON REASONING TESTS

Score	Number of Cases		
	Schizophrenic	Paretic	Non-Psychotic
80 - 89.9	1	..	1
70 - 79.9	6	..	2
60 - 69.9	4	1	6
50 - 59.9	16	1	11
40 - 49.9	11	..	8
30 - 39.9	16	3	2
20 - 29.9	12	7	..
10 - 19.9	10	10	..
0 - 9.9	24	9	..
Total No. of Cases	100	30	30

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